THE STUDY OF ACENAPHTHENE AND ITS COMPLEXATION WITH WATER

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Acenaphthene (Ace) is a three ring polycyclic aromatic hydrocarbon (PAH), which consists of naphthalene and a non-aromatic five member ring. Ace has been previously been studied by microwave spectroscopy where the rotational constants were reported[1]. New measurements from 2-8 GHz using chirped pulse-Fourier transform microwave spectroscopy (CP-FTMW) will be presented. The high sensitivity achieved enabled us to observe all ^{13}C isotopologues in natural abundance and determine the Kraitchman substitution structure. The spectra of Ace complexed with water and $H_2{}^{18}O$ were also recorded at this frequency range. From these spectra, we have been able to assign the complexes Ace-$(H_2O)_n$, n=1-3 and $(Ace)_2$-H_2O and experimentally derive the O-atom position of the H_2O. The Ace-$(H_2O)_3$ complex is especially interesting as the water aggregate forms a slightly distorted cyclic water trimer from that observed in the IR[2]. These complexes could give insight about the formation of ice grains in the interstellar medium.

[1] Thorwirth, S., Theulé, P., Gottlieb, C.A., McCarthy, M.C., Thaddeus, P. *Astrophys. J.*, 662, 1309-1314, **2007**.
[2] Keutsch, F.N., Cruzan, J.D., Saykally, R.J. *Chem. Rev.*, 103, 2533-2577, **2003**.